

Remarks

Claims 1 – 16 are pending in this action. Claims 1 – 3, 8 – 11, 15, and 16, stand rejected. Claims 4 – 7, and 12 – 14 are objected to. Applicants respectfully request reconsideration of all pending claims herein in view of the following response.

Claim Rejections – Non-Statutory Double Patenting

The office action stated that claims 1-3, 8, and 9 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 10-12, 15, 19-21, 24, 33, 37 and 38 of commonly assigned U.S. Patent No. 6,003,757 to Beaumont et al.

Applicants submit that claims 1-3, 8, and 9 of the instant application are distinctly patentable over the claims of USPN 6,003,757 listed above because the present invention adds a thermally ductile buffer between the mold and the solder which forms the solder bump and enables the mold and receiving substrate to separate when the solder is in a molten state without having to perform more than one reflow step i.e. the bump structure is maintained after the first reflow step (See Brouillette paragraph 19 – 20 and 25, and Figure 2 element 16). Applicants have amended Claim 1 to specifically include “a thermally ductile buffer” to further distinguish Claim 1 from Beaumont et al.

Therefore, Applicants respectfully submit that the Office Action rejection of Claim 1 under the doctrine of obviousness-type double patenting has been overcome and as such, the rejection of dependent Claims 2-3, 8 and 9 has also been overcome.

Claim Rejections – 35 U.S.C. 102 (b)

The Office Action stated that claims 1-3, 9 – 11, and 16 have been rejected under 35 U.S.C. 102(b) as being anticipated by Covell et al. (U.S. Patent Number 5,718,367). The Office Action stated that Covell teaches a method and apparatus for transferring solder bumps from a mold to pads of a substrate, wherein the mold has a plurality of solder elements and is positioned on a

substrate such that the solder elements contact the corresponding pads, pressing a plate on the mold, heating the solder elements, and removing the plate while the solder is molten.

Covell et al. describes an apparatus and method for placing and aligning a mold, having metallic material, over the substrate, providing a clamp to keep the mold in contact with the substrate without applying compression to the mold, heating the combined assembly until the metallic material melts, cooling the assembly until the metallic material solidifies, and removing the mold from the substrate (Covell et al. Abstract, Summary, Col. 5 lines 41 – 48, and 59 – 63, Figures 4 and 5, and Claims 1, 24, and 46).

Applicants submit that the Covell et al. patent does not apply to large substrates used in wafer level C4 transfer and furthermore, cannot be used to accomplish wafer level C4 solder bump transfers because of the heating and cooling process that Covell et al describes is not sufficient to provide intimate contact between the solder and the solder receiving pads (see Brouillette paragraph 7). To overcome this problem, Applicants' invention uses compression to ensure that solder adheres to the corresponding solder pads (see Brouillette Summary, Abstract, Figures 2-5, paragraphs 21-23, and Claims 1 and 10).

Claims 2 – 3, and 9 are dependent upon Claim 1, and Claims 11 and 16 are dependent on claim 10; and as discussed above, Claims 1 and 10, are not anticipated by Covell because Covell does not disclose a compression means.

Therefore, Applicants respectfully submit that the rejection of Claims 1 – 3, 9 – 11, and 16 under 35 U.S.C §102(b) has been overcome.

Claim Rejections – 35 U.S.C. 102 (e)

The Office Action stated that claims 1- 3, 9 – 11, and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Brouillette et al., U.S. Patent Number 6,394,334 ('334). The Office Action stated that Brouillette teaches a method and apparatus for transferring solder bumps from a mold to pads of a substrate, wherein the mold has a plurality of solder elements and is positioned

on a substrate such that the solder elements contact the corresponding pads, pressing a plate on the mold, heating the solder elements, and removing the plate while the solder is molten. The apparatus comprises a reflow heating device and a mold with multiple cavities.

Applicants submit that the '334 patent describes a solder transfer process as shown in Figures 7a – 7d; however, the '334 patent does not anticipate or suggest the use of a thermally ductile buffer (see '334 Col. 9 line 53 – Col. 10 line 17). Applicants have amended independent Claims 1 and 10 to specifically include a “thermally ductile buffer” to further patentably distinguish Claims 1 and 10 over the '334 patent.

Therefore, Applicants respectfully submit that the '334 patent does not anticipate Applicants' Claims 1 and 10 as amended and thus the rejection of Claims 1 – 3, 9 – 11, and 16 under 35 U.S.C §102(e) has been overcome because Claims 2 – 3 and 9 are dependent on Claim 1 and Claims 11 and 16 are dependent on Claim 10.

The Office Action stated that claims 1- 3, 8 – 11, 15 and 16 are rejected under 35 U.S.C. §102(e) as being anticipated by Beaumont et al., U.S. Patent Number 6,003,757 ('757). The Office Action stated that Beaumont teaches a method and apparatus for transferring solder bumps from a mold to pads of a substrate, wherein the mold has a plurality of solder elements and is positioned on a substrate such that the solder elements contact the corresponding pads, pressing a plate on the mold, heating the solder elements, and removing the plate while the solder is molten. The apparatus comprises a reflow heating device and a mold with multiple cavities and multiple pressing devices.

Applicants submit that the '757 patent does not anticipate or suggest a thermally ductile buffer or equivalent thereof. Thus, Applicants have amended independent Claims 1 and 10 to include the limitation of a “thermally ductile buffer” to further patentably distinguish Claims 1 and 10 over the '757 patent.

Therefore, Applicants respectfully submit that the '757 patent does not anticipate Applicants' Claims 1 and 10 as amended and thus the rejection of Claims 1 – 3, 9 – 11, and 16

under 35 U.S.C §102(e) has been overcome because Claims 2 – 3 and 9 are dependent on Claim 1 and Claims 11 and 16 are dependent on Claim 10.

Prior Art Made of Record

The prior art made of record in the Office Action and not relied upon, i.e. USPN 4,412,642, USPN 6,153,505, USPN 5,381,848, and USPN 6,708,872 have been reviewed and Applicants respectfully submit that the references cited do not anticipate or suggest the elements of Claims 1 – 3, 8-11, 15 and 16 (as amended).

Summary and Conclusion

Based on the foregoing, it is respectfully submitted that the pending claims in the subject patent application are in condition for allowance and that the application may be passed to issuance.

The Examiner is urged to call the undersigned at the number listed below if, in the Examiner's opinion, such a phone conference would aid in furthering the prosecution of this application.

Respectfully submitted,

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